

AGRICULTURAL EDUCATION IN FRANCE.

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INTRODUCTION.

France has a remarkably complete system of agricultural education. It is more comprehensive than our own, in that it reaches a wider range of people, and its different parts are more closely coordinated, the whole system being under the control of one central authority. It begins in the rural primary schools with the simplest facts of agriculture, extends through every phase of practice and theory in special schools, and culminates in a national institute, where the highest forms of agricultural instruction are given by a staff of the first men of science of France.

In this system there are schools for the sons of farm laborers who expect to continue in the vocation of their fathers; schools for the sons of the peasant proprietors and the small-farmer class who expect to return to the farm; schools for the sons of landed proprietors who will manage estates and act as leaders in agricultural progress; schools for training teachers of agriculture, managers of agricultural technical industries, and high officials for serving the state at home and abroad in agricultural positions. Not only do these schools give instruction in agriculture in general, but there is also extensive provision made for the conduct of special schools to meet the wants of different sections of the country. These include schools of dairying, viticulture, poultry raising, irrigation and drainage, cheese making, silk making, fish culture, forestry, horse breeding, technical agricultural industries, horticulture, veterinary science, etc. In this article it is proposed to outline the general provisions of the scheme observed in France for agricultural instruction and to describe some of the more important schools.

NATIONAL DEPARTMENT OF AGRICULTURE.

At the head of the whole agricultural system in France is the National Department of Agriculture. The department was created in 1881 for the purpose of promoting the interests of agriculture. It is made up of four great technical divisions, namely, agriculture, breeding of horses, forestry, and agricultural hydraulics. The purpose of the department is to obtain and distribute agricultural information, to stimulate agricultural research and teaching, and to further the agricultural interests of France. To aid in this work an extensive

series of publications has been instituted. These publications report the laws of the country relative to agriculture and the official acts of the ministry of agriculture, give the annual and decennial agricultural statistics of the country, and contain agricultural reports, memoirs of specialists, and papers on different phases of agriculture. Various reports of agricultural schools, departmental professors, and experiment stations are also published. Supplementary to these publications, the ministry encourages authors by buying and circulating agricultural books acknowledged to be useful to agriculturists. From \$5,000 to \$7,500 is expended each year in this way.

The issuing of publications, however, is only one of the means of encouraging agriculture. Far more effective than this is the extensive system of agricultural teaching adopted. Since 1898 the supervision of this teaching has been intrusted to a "Superior Council of Agricultural Education." This consists of 30 members, and is charged with the general supervision of all institutions affording agricultural instruction founded or subsidized by the ministry of agriculture. "All proposals for the formation of new schools are submitted to the council, and it receives the reports of the directors and professors. The council meets at least once a year and forwards a general report to the minister of agriculture, containing its views respecting improvements or alterations of the system as a whole. The minister of agriculture is the president of the council. * * * Members other than those holding their positions *ex officio* are appointed for four years, one-half of the number retiring every two years. Fifteen members of the council form a permanent association, which meets to consider urgent matters whenever summoned by the minister of agriculture."

For the more detailed work of inspection there are three inspectors-general. These organize the Paris and district agricultural shows and inspect the national schools of agriculture and the Agronomic Institute at Paris. In addition, there is one inspector for each of the eight agricultural districts of the country. These inspectors have the supervision of the lower agricultural schools and of the departmental and special professors. They also organize and preside over district shows.

With this brief survey of the general system of supervision, some of the more important institutions provided for agricultural teaching may be noticed.

THE AGRONOMIC INSTITUTE.

This is the highest institution giving agricultural instruction in France. It is located in Paris, and was first opened to students in 1876. It is a post-graduate school of university type for all other agricultural institutions in France, except the School of Forestry at Nancy and the School of Horse Breeding at Le Pin. Its purpose is to qualify students for (1) agriculturists and proprietors of estates; (2)

professorships in the national and practical schools of agriculture and for departmental and normal-school professors; (3) administrators, capable of taking charge of special agricultural investigations, as inspection, phylloxera investigations, etc.; (4) directors of agricultural experiment stations; (5) chemists or directors of agricultural industries (sugar making, distilling, starch making, manufacture of fertilizers), or agricultural engineers (mechanical, drainage, irrigation, etc.).

The institute has at its disposal suitable laboratories and buildings, and in addition about 65 acres of land, which is used for the growing of plants and research work of the professors, for the object of the school is not only the teaching of all the known facts of the sciences relating to agriculture, but also experimentation in new fields. The teaching staff, consisting in 1899 of a personnel of sixty-five, contains among its members many of the highest scientific authorities of France. Such familiar names as Boussingault, Hervé-Mangon, Schlœsing, Aimé Girard, A. Carnot, Risler, Delesse, Breuil, Tassy, Prillieux, Müntz, etc., are found on the first faculty roll of the institution, some of whom are still occupying chairs in the school.

Candidates for admission to the school must be at least 17 years old, and are subject to competitive examination in the natural sciences, French composition, and descriptive geometry. For graduates of universities or the national schools of agriculture and veterinary science, the examinations are somewhat modified. Under certain conditions students may be admitted to the lectures without examination, but are debarred from laboratory work, and are not granted a diploma. Tuition is about \$100 per year for regular students, and \$10 for students attending the lectures only. The school has no dormitories.

Work begins at 8 o'clock a. m. and continues until 4 p. m., with an intermission of one and one-half hours at noon for lunch. All exercises and studies are compulsory. There are six scholarships having an annual value of about \$200 each, and four of a value of \$100 each, offered by the state. Free tuition goes with these scholarships. There are ten other scholarships giving free tuition alone, and in addition certain other scholarships offered by the city of Paris and Seine department to native-born students.

The course of study occupies two years, with a vacation of three months each year. Two months of each vacation are required to be spent in actual agricultural practice, either in France or abroad, and a report of the work must be handed in. Excursions to fairs, stock markets, etc., are a prominent feature of the course. The subjects each year of the course are as follows:

FIRST YEAR.—Vegetable physiology and anatomy, descriptive botany, mineralogy and geology, mathematics, agricultural mechanics, physics

and meteorology, general chemistry, general agriculture, viticulture, general zootechny, political economy, rural hygiene, agricultural zoology, and the anatomy and physiology of animals.

SECOND YEAR.—Vegetable pathology, microorganisms, agricultural chemistry, special and colonial crops, comparative agriculture, arboriculture and horticulture, agricultural machinery, agricultural hydraulics, special zootechny, agricultural technology, farm law, rural economy, economic forestry, and agricultural bookkeeping.

Upon the completion of the course the degree of agricultural engineer is granted. The first 60 who have attained a standing of at least 70 per cent for the whole two years are exempted in time of peace from two of the three years' compulsory military service. The two students standing highest on the examination list are eligible for three years' special missions either in France or in foreign countries, with a Government allowance of \$579 per annum. The first 10 or 12 on the list, depending on the needs of the state for foresters, are eligible to studentships in the National School of Forestry at Nancy, and are given an allowance of \$300 per year. The three highest among those desiring work in the Government horse-breeding school are made eligible for such positions. Nine others, selected on the basis of scholarship, are eligible to positions equivalent to one-year fellowships either in the laboratories of the institute or elsewhere in agricultural industrial occupations, with an allowance of \$20 per month. Former students at the institute who possess the bachelor's degree in addition to the diploma of the institute are eligible for attachéships, consular, and other administration positions.

A recent report shows that of 882 graduates of this school, 91 per cent are engaged in agricultural occupations or industries immediately related thereto.

NATIONAL SCHOOLS OF AGRICULTURE.

There are nine national schools of agriculture in France—three of general agriculture, three of veterinary science, and one each of horticulture, dairying, and technical agricultural industries.

NATIONAL AGRICULTURAL SCHOOLS.

The most noted of these schools is located at Grignon, near Paris. This school was founded as a private institution in 1826, and is the oldest agricultural institution in France. It was placed partly under Government control and patronage in 1849, and in 1872 was reorganized, together with the agricultural school at Rennes in western France and the school at Montpellier in the extreme south of France, into a national school of agriculture, under the direct control of the state, and supported entirely by it.

The three national schools of agriculture are more practical in nature

than the National Agronomic Institute, and correspond more nearly to the State agricultural colleges in this country. Their purpose is to fit young men for positions as managers of estates and as teachers of agriculture. The teaching in these schools is both theoretical and practical. The course covers two and one-half years at Grignon and Montpellier and two years at Rennes. Only day students are received at Rennes. At Grignon and Montpellier students may obtain full board, or half board, or they may board away from the school. Tuition with full board costs \$232 per year at Grignon and \$193 at each of the other two schools. With half board, tuition is \$116 per year. Day students pay \$80 per year. Students hearing the lectures and taking practical work, but who do not take laboratory work, pay \$40 per year. They receive neither diploma nor certificate. Military discipline is observed at the schools, and is very strict. Deviation from the rules without previous permission or failure at the sessional examinations entails expulsion. Candidates for admission to the full course in these schools must be at least 16 years old, and are subject to both a written and an oral competitive examination in French, elementary mathematics, physics, chemistry, and natural science. Those who pass the written examinations are permitted to take the oral examination. The number of vacancies in the school is fixed annually by the minister of agriculture, and seldom exceeds forty. Men only are admitted. Students standing highest on the examination list have first choice as to the school which they will enter.

Upon the completion of the course the diploma of the school is conferred by the minister of agriculture. It carries with it two years' exemption from military duty, and counts a certain number of points on the entrance examination at the National Agronomic Institute.

The teaching in the different schools is made to conform largely to the agricultural requirements of the districts in which they are located. Thus, at Grignon general agriculture, as the growing of cereals, roots, and forage crops, the breeding of stock, pasturage, and the general agriculture of northern France are dealt with especially. At Montpellier the farming is more subtropical, and the cultivation of the orange, olive, mulberry, and the vine, and the processes of wine making are studied especially, as well as methods of irrigation and the replanting of moorlands and mountain sides. The school has given special attention also to parasitic diseases, the combating of the phylloxera, and in renewing the destroyed vineyards of the district. The school at Rennes is located in an important cider-producing and pasturage district, and hence much attention is given to these subjects.

The courses of study in the different schools are very similar, only slight differences appearing in the more practical part of the work. The course at Grignon may be selected for illustration: It consists of agriculture, botany, general and agricultural chemistry, economics,

rural legislation, rural engineering, construction and repair of agricultural machinery, physics, meteorology, agricultural technology, silviculture, viticulture, and pomology. Lectures are also delivered by specialists in geology, mineralogy, horticulture, and entomology. The students also receive instruction in military tactics.

Connected with each school is a farm for practical work, an extensive library, and well-equipped laboratories. The farm at Grignon contains 321 acres of arable land and 370 acres of woodland, besides various kitchen, botanical, and other gardens, especially adapted to the study of certain branches. Specimens of the best breeds of sheep, cattle, pigs, and poultry are kept, and experiments made with different crops and fertilizers. Attached to the institute as annexes are several establishments for making researches and experiments. These are the poultry farm at Joinville le Pont, in the neighborhood of Paris; an experiment station for determining the best kind of seeds to be sown, when to sow them, and when to harvest; another for experimenting with different kinds of agricultural machinery; a laboratory for the special study of fermentation as applied to brewing, and to wine, cheese, and butter making; and a laboratory of vegetable pathology, where plant diseases are studied. The machines are taken apart and reassembled by the students, and their uses and modes of repair explained by expert machinists.

At Montpellier a school for the breeding and study of silkworms has been organized for the better instruction of the students and a meteorological department added for the same purpose.

These national schools train the major portion of the leaders in French agriculture. They supply most of the departmental and special professors of agriculture, the teachers of the lower agricultural schools, and the managers of estates and technical agricultural industries. The many receive higher agricultural instruction in these schools, while but comparatively few are able to take post-graduate work at the National Agronomic Institute.

NATIONAL HORTICULTURAL SCHOOL.

The National School of Horticulture at Versailles was established in 1873. The old kitchen garden of Louis XIV was placed at the disposal of the school for practical work and demonstrations. The place consists of about 25 acres of fruit and vegetable gardens, greenhouses, forcing houses, etc. The institution has a three years' course in theoretical teaching and practical horticultural operations. Tuition is free. Pupils board themselves. The age of admission is between 16 and 26. Students must be physically capable of performing manual labor, and are subject to a competitive written and oral examination. The number admitted each year is limited to forty. There were seventy-seven applications for admittance to this school in 1900. The

student body is made up largely of the sons of the laboring and middle classes. Some eighteen scholarships in this school are offered by the state and by various departments and agricultural societies to the students who receive the highest entrance examination marks. Scholarships are about sufficient to cover the board and lodging of the holders. The teaching force of the school consists of twelve professors and four chief gardeners and overseers. The course includes instruction in orchard and small-fruit culture and the growing of vegetables, flowers, and ornamental shrubs in the open and under glass, nursery methods, greenhouse architecture, elementary and descriptive botany, bookkeeping, drawing, the English and French languages, leveling as related to horticulture, elements of mathematics, physics, meteorology, chemistry, geology and mineralogy, pomology, zoology, and horticultural entomology.

Theoretical teaching in these subjects is supplemented by practical work in the vegetable garden, forcing house, botanical garden, orangery, grape and peach houses, nursery, rosary, flower garden, and on the lawns, walks, and terraces of the grounds. Laboratory work in physics, chemistry, and botany is also given.

The school hours are from 6 a. m. to 9 p. m. in winter, and from 5 a. m. to 9 p. m. in summer, with intervals of one and one-half hours for meals. Four hours in winter and two and one-half hours in summer are given to theoretical teaching. At the end of each two weeks pupils make a report to the director on their work. In addition to the work of the school, excursions are made to a number of the more important horticultural establishments for the purpose of observation.

A general examination is held at the end of each year. Those who have completed the work receive a diploma from the minister of agriculture. In 1894, 89 per cent of the graduates of the school were engaged in horticultural operations. There is a wide demand for their services throughout France, and the school is believed to meet a specific want in French horticulture.

NATIONAL DAIRY SCHOOL.

The National Dairy-Farm School was established in 1888. It teaches the theory and practice of butter and cheese production, is a station of information for the district on all subjects pertaining to the dairy industry, and conducts experimental investigations along dairy lines. It is intended to meet the wants of young men who expect to take up dairying as an occupation, and of all others who wish to acquaint themselves with the latest and most improved dairy practices.

The school is well equipped with all the latest machinery and apparatus necessary for the production of first-quality products. The milk used is obtained by a cooperative arrangement with neighboring farmers. A field of about 7 acres is attached to the school. Here soiling

crops are grown intensively. The botanical garden contains plants which are known to affect the quality of milk. The course lasts one year, and is gratuitous. It includes dairy farming, chemistry, technology, zootechnics, bookkeeping for dairy farms, the elements of general physics and chemistry, mechanics, microorganisms, and botany. Practical work is had in the manufacture of butter and the varieties of cheese best suited to the French market.

The teaching staff consists of a director, professor of technology and chemistry, veterinary surgeon, professor of zootechnics, two experts in cheese manufacture, and a milk inspector. Candidates for admission to the school must be between 17 and 30 years old. Those holding the diploma of a primary school, farm school, or of a practical agricultural school are admitted without entrance examination. Others are examined in mathematics and the history and geography of France and her colonies. Pupils room and board themselves. There are a number of scholarships for deserving students, which are obtained by competitive examination.

The school is especially valuable to the district in which it is located. It gives practical advice on all matters pertaining to dairy interests and conducts experimental work in feeding milch cows, to determine the effects on the quantity and quality of the milk of certain rations and methods of feeding.

NATIONAL SCHOOL OF AGRICULTURAL INDUSTRIES.

The National School of Agricultural Industries at Douai was founded in 1893, for the purpose of giving professional instruction to young men who purpose to become foremen or managers of sugar factories, distilleries, breweries, or other technical agricultural industries. The school is restricted entirely to French students. All students are non-residents. The full course covers two years. Tuition is about \$96 per year. There are a few scholarships for deserving pupils. Candidates for admission must be at least 16 years old. Special courses are offered to pupils wishing to study a particular branch. Graduates of the National Agronomic Institute or of the national schools of agriculture are required to spend only one year at the institution.

The staff of the school consists of a director, subdirector, eight professors, four tutors, and one mechanic. The general course includes elementary and applied mathematics, mechanics, industrial drawing and construction, physics, chemistry, agricultural zootechny, rural and industrial law, and bookkeeping. The technical course includes instruction in the manufacture of sugar, distilling, brewing, and divers other technical industries, as the manufacture of starch, vinegar, etc.

Theoretical instruction is supplemented by practical work. For this purpose, according to a recent report of the Victorian Royal Commission on technical education, "the school is provided with all the

appliances essential for the manufacture of sugar, the distilling of alcohol, and the brewing of beer. The producing capacity of the machinery amounts to 220 gallons of alcohol and 260 gallons of beer per day, and the sugar can be extracted from about 20 tons of beet roots daily. Diplomas and certificates are awarded at the end of the course to students who succeed in obtaining the standard marks, and this document can be specialized for any particular industry or industries."

PRACTICAL SCHOOLS.

These schools are intermediate between the national schools just noted and the farm schools to be described later. They are intended for the sons of the peasant proprietor and small farmer classes. It is expected that those who attend them will return again to the farm, not finished agriculturists, yet well grounded in the fundamental principles of agriculture. Many of the students in the national schools are graduates from these practical schools.

The practical schools are not wholly national, but are usually in part departmental, local, or private schools. The Government pays for the teaching and usually for a few scholarships, approves the course of study, and has general oversight of the schools, but all the buildings, equipment, and the farms connected therewith must be supplied locally. Usually the schools are held on domains and in buildings remodeled for the purpose. The farms attached vary in size from 100 to 350 acres.

The course in the different schools varies from two to three years, with a tendency to reduce the number to two years. It is about equally divided between theoretical instruction and practical work in the stables and on the farm. The practical work is diversified in the different schools to correspond to the general needs of the district in which it is located. The theoretical teaching, however, is fairly uniform in all, as follows: Arithmetic, geometry, surveying, leveling, linear drawing, agricultural geography, physics, meteorology, agricultural chemistry, zoology, entomology, botany, plant diseases, general agriculture, special cultures, farm machinery, farm law, animal husbandry, sanitation, horticulture, tree culture, farm accounts, morals, French, and military exercises.

The school staff generally consists of a director, who may also be a professor; one professor each of agriculture, physics and chemistry, and natural sciences; a veterinarian; a supervising principal; a superintendent of agricultural work; a superintendent of horticulture; and a military director. The professors in the schools are usually graduates of the National Agronomic Institute or of the national schools. The cost to the state for teaching in these schools varies from \$3,500 to \$4,800 per annum for each school.

Candidates for admission to these practical schools are subject to an

examination in French, arithmetic, and the history and geography of France, unless they hold a certificate of elementary education. The age of admission ranges from 14 to 16 years, and the average number of pupils in each school is from thirty to forty. Tuition, board, and lodging at the schools vary, according to locality, from \$77 to \$116 per year. Tuition alone is \$10. Pupils usually board at the schools.

At the present time there are forty-three of these schools in different parts of France. Twenty-four are agricultural schools, two schools of irrigation and drainage, five schools of southern and Algerian cultures, four schools of viticulture, seven dairy and cheese schools, and one school of aviculture.

These schools have proven especially valuable in improving the agricultural operations of the peasant farmers of France. The knowledge of their worth has extended far outside of the boundaries of France, and they have been imitated in nearly all of the countries of Europe.

FARM SCHOOLS.

The French farm schools are practical schools of apprenticeship. They are designed primarily for the purpose of training the sons of the peasant laboring class in the practical details of farm work. The use of farm machinery and tools, care and management of animals, the seeding, cultivation, and harvesting of crops, and other farm work are taught practically. Theoretical instruction is given in the French language in arithmetic, surveying, leveling, farm bookkeeping, and the more general principles of agriculture, horticulture, and arboriculture.

These schools were first established by private initiative, and up to 1845 nine had come into existence. At this time the Government became interested in them, and a law was passed organizing them all on a uniform basis. State aid was given for defraying the expenses of the teaching personnel and for boarding the apprentices, but leaving to the director or proprietor of the estate on which the school was located the care and responsibility of the direction of the school and the expenses and profits of running it. The state requires the farm on which the school is conducted to be a model for the surrounding neighborhood. Each year a programme of work must be submitted for the approval of the administration. The schools are inspected by the district inspectors of agriculture and are reported upon by them to the minister of agriculture regarding their control.

The teaching force of these schools, besides the director, generally consists of a superintendent, who teaches the apprentices the use of tools and farm machinery and directs the field operations and the indoor work of the barn and stables; a bookkeeper, who teaches farm accounts and takes such elementary classes as may be necessary; a

gardener, to direct the operations of the vegetable garden and orchard; and a veterinarian, to give instruction on the hygiene and characteristics of animals and discuss the more simple operations of first aid to be given them in time of need. This force is sometimes supplemented by specialists, as a chief irrigator, viticulturist, dairyman, etc.

The period of apprenticeship at these schools varies from two to three years. Pupils are admitted when 16 years old, and the average number in a school is about twenty. Those who do not hold a certificate from the primary schools are examined in the elementary branches and must pass a physical examination. Upon the satisfactory completion of the course, a diploma is given and a bonus of \$60. Those who do not obtain a diploma receive a bonus of \$39.

Supplementary to the farm schools are a number of other schools of a like grade. These include two sheep-farm schools, one silk school, fourteen cheese-making schools, one school of fish culture, and two primary agricultural schools.

At one period these farm schools were very popular in France. Up to 1850 some seventy had been established. From that time on the number gradually decreased until the present time, when there remain but fourteen. Many of the original schools have been converted into the practical schools of agriculture, previously noted. Others declined because the peasantry were unwilling to part with the aid of their children for two or three years when they might learn about the same thing and at the same time earn from \$50 to \$75 per year on a well-managed estate. At the present time most of the farm schools are in the south of France, where agriculture is least advanced, and the work at most of them closely approximates the work offered in the practical schools.

AGRICULTURE IN THE PUBLIC SCHOOLS.

The schools thus far described are given up entirely to agricultural teaching. There remains for discussion the public-school system, in which agriculture is but one branch of the general course. Agricultural instruction is given in all French normal schools for men, and by the laws of 1879, 1887, and 1888, it has been made obligatory to teach in the rural elementary schools the elements of the natural and physical sciences, with their application to agriculture. According to the French programme of 1887, which is translated in full in the Report of the U. S. Commissioner of Education for 1895-96, agricultural instruction in the primary schools is as follows:

ELEMENTARY PRIMARY INSTRUCTION.—*Elementary course (pupils 7 to 9 years old):* First lessons in the garden and school. *Middle course (pupils 9 to 11 years old):* Ideas appropriate to what the child has read; object lessons and excursions for the purpose of familiarizing pupils with soils, fertilizers, tillage, and common implements. *Higher*

course (pupils 11 to 13 years old): More methodical instruction on tillage, implements, drainage, fertilizers of all kinds, sowing, harvesting, domestic animals, and bookkeeping; ideas about horticultural propagation, tree culture, and grafting.

SUPERIOR PRIMARY INSTRUCTION.—*Advanced course for boys and girls over 13 years old:* Practical ideas about vegetation, the duration of growth, and reproduction (by seeds, buds, grafts); different kinds of lands, manures and their use, and rotation; the use of agricultural implements and machines; principal operations in agriculture, such as breaking up land, planting, transplanting, drainage, and irrigation; principal crops of France and of the locality; diseases of plants, parasites; legumes, fruits, flowers; use of sash; training and pruning fruit trees; care of domestic animals; bee culture.

About 3,400 of the rural primary schools have gardens attached to them. There are 160 superior primary schools, in which more than 15,000 pupils receive instruction in agriculture.

Official circulars have been issued by the ministry of agriculture suggesting the ideas and purposes involved in the agricultural instruction to be given. These direct that the instruction shall be addressed less to the memory than to the intelligence of the child. It should be based on the observations of facts in country life and on simple experiments with familiar objects, and designed to prove the scientific fundamental ideas of the most important agricultural operations. The children should learn above all things else the reasons for the operations rather than the manner of performing them. Still less should they be compelled to learn a list of definitions, precepts, or agricultural recipes.

The aim of the elementary instruction is to give the greatest number of country children that degree of elementary knowledge which is essential to enable them to read a modern book on agriculture or attend an agricultural meeting with profit; to inspire them with a love of country life, so that they may prefer it to that of towns and factories; and to inculcate the truth that agriculture, besides being the most independent of all occupations, is also more remunerative than many others for industrious, intelligent, and well-instructed farmers.

It was difficult in the beginning—and the difficulty has lasted well up to the present time—to initiate the teachers into the spirit of the new teaching in the primary schools. Books on agriculture were placed in the hands of the pupils; agricultural rules, even though sometimes debatable, were taught as axiomatic truths; the memory rather than the understanding was consulted, and the learning of words rather than the observation of facts was made the basis of agricultural teaching.

In order to supply teachers with an adequate knowledge of the

principles of agriculture, a course of agriculture was established in all the normal schools for men. It was not intended that the normal schools should be turned into agronomic institutes, but that agriculture should be given an honorable place in the school curriculum. It was desired to give the graduates of such schools an exact knowledge of the soil, the means of improving it, the methods of cultivation, and the general management of farms, gardens, and stables. According to the minister of education, it is sufficient if teachers in the elementary schools teach simply the elements of agriculture, give wise counsel in the neighborhood, and, if necessary, combat effectually routine and prejudice. To accomplish this the instruction given by the teacher should be accurate and clear. The ideas of the pupils should be rectified by visits to the best farms, by some laboratory work, and by frequent tests in the garden or demonstration field of the school. The object of the course in the normal schools is not to teach the business of farming, but to study the phenomena of life and the condition of its development, to inspire a love for the country, and to develop the natural tendencies of children to become interested in flowers, birds, etc.

In the normal-school programme for teachers two hours a week are devoted to agriculture, zootechny, and rural economy in the second year of the course, as follows: (1) *Vegetable growing*—study of the soil; the means of modifying its chemical composition and physical properties by fertilizers; irrigation; drainage; cultivation; rotation of crops, and special crops, such as cereals, legumes, etc. (2) *Zootechny*—feeding of horses, cows, sheep, and swine. (3) *Rural economy*—property in land; methods of exploitation and capital required; bookkeeping. In the third year of the normal course one hour a week is devoted to fruit-tree and vegetable growing, as follows: General ideas of culture; planting and preparing the soil; work in the orchard and garden. It is expected that the professors will emphasize the methods and products of the localities in which the schools are located.

DEPARTMENTAL AND SPECIAL PROFESSORS.

Thus far there have been described simply the schools in which the youth of France receive instruction in agriculture—the National Agronomic Institute, the national schools, the practical schools, the farm schools, the rural primary schools, and the public normal schools for men. There still remain the farmers themselves, who need instruction, and besides the whole system of agricultural instruction needs to be bound together and unified. For the purpose of general supervision there are, as already mentioned, the three inspectors-general and the eight district inspectors. There are also the departmental and special professors. A department in France may be compared in a general way to a county in the United States. In 1894 ninety of the departments of France had been supplied with departmental professors of agriculture,

as authorized by the law of 1879. There were also 114 special professors. The respective functions of these two officers are as follows:

The departmental professor is charged (1) with giving a two years' course in agriculture in the public normal schools (see page 127), thus grounding the future teachers in the rural primary schools in the principles of agriculture, and (2) with holding at least twenty-six institutes a year. The object of these institutes is to teach the farmers of the district facts regarding seeds and varieties, the use of commercial fertilizers, treatment of vines, replanting vineyards, and the means of combating drought, excessive moisture, insect ravages, etc. He lectures always on subjects of most interest to the local agriculturist, and is under the direct control of the department of agriculture, though paid in part by the department of education.

The special professor gives (1) a course of agriculture to the pupils in the last two years of the superior primary schools, and (2) short courses to adults in some of the rural wards. The course for adults given by the special professor differs from that given by the departmental professor in that "the province of the first is to inform; that of the second to teach." The special professor gives short courses of from four to ten days' duration, according to the needs in different localities. It is intended that this work shall supplement the information acquired in the superior primary schools and in schools of practical agriculture, to refresh the memory of older students of agricultural schools, bringing up to date the latest agricultural information, and to prepare the farmers to follow with profit the instruction of the departmental professor.

These annual reviews of agricultural progress are believed to be of much practical benefit to rural interests. The lack of experience sometimes found in young professors is commented on unfavorably, but on the whole the agricultural teaching of the departmental and special professors is in good favor. During the year 1893 more than 300,000 farmers and teachers were in attendance at the departmental institutes.

The departmental professor has still another rôle in agricultural teaching. Not only does the French Government require that farmers be taught the theory of agriculture by word of mouth, but they must also be taught the fact by ocular demonstration. For this purpose small fields of demonstration have been created, where the good effects of fertilizers or tillage operations, varieties, etc., may witness to the locality the truth of the theories presented in the institutes and conferences. These fields of demonstration are under the direct control of the departmental professors. They are popular with the people, and are ranked among the most powerful factors for increasing French agricultural productions. In 1894, 3,362 of these fields of demonstration had been created in the different departments of France.

EXPERIMENT STATIONS AND LABORATORIES.

In addition to the fields of demonstration already noted, there were in 1894 seventy-seven establishments in France for agricultural analysis and research. These also render much service to the agricultural population. In the laboratories fertilizers, food stuffs, soils, seeds, waters, etc., are analyzed, and in the stations original investigations in agricultural problems are undertaken. These experiment stations are usually smaller institutions than our own, and in comparison are relatively weak in working force, equipment, and resources. They are, however, of very great use to the localities in which they are located.

SUMMARY.

To sum up, the various factors which enter into the agricultural educational system of France are:

(1) The rural primary schools, in which are taught the elements of the natural and physical sciences as related to agriculture. The aim in these schools is to create in the pupils a love of nature and to give them a knowledge of the simplest facts in agriculture. They reach the masses. As a preliminary, there is involved the systematic training of teachers in the departmental normal schools for this work.

(2) The maintaining in each department and nearly every commune of trained agriculturists, who conduct successive short courses in agriculture especially adapted to the needs of the community at the time, manage fields of demonstration in the locality, thus manifesting to the eye the truth of the theories presented and the value of scientific methods in agriculture, and act as a bureau of agricultural information for the community at all times. They teach the farmers themselves. The experiment stations and laboratories, widely distributed throughout France, serve much the same purpose as these trained agriculturists, and undertake some original investigations pertinent to the locality.

(3) The semiprivate farm and practical schools for the training of sons of farm laborers, peasant proprietors, and the small-farmer class in the best farm practices, and grounding them in the basic principles of scientific agriculture. They train the men who are to do the actual work on the farm.

(4) The national schools, giving a higher grade of instruction in agriculture, horticulture, forestry, veterinary science, and the technical agricultural industries to sons of the large landed proprietors and to the more apt pupils of the lower schools. They train the teachers and leaders in agricultural progress and furnish managers of agricultural industries.

(5) The National Agronomic Institute at Paris, serving as a kind of

post-graduate school in agriculture of a university type, and commanding the services of a corps of the ablest scientific men in France. Here the latest facts in scientific agriculture in France and elsewhere are accumulated and published, and original research work in agriculture is undertaken. It trains teachers and leaders capable of raising and maintaining the agriculture of the country on a high level, of serving in governmental positions, or of molding the agricultural policy of the state.

Summarizing, then, for the whole country, it will be seen that, besides obligatory teaching in all rural primary schools, France has, in all, 12 institutions for teaching agriculture of the first and second degrees, 43 for teaching the third degree, 34 for pure practice of apprenticeship, 3,362 fields of demonstration, 77 establishments for analysis and agricultural research, and 214 departmental and special professors of agriculture, who give instruction yearly to 300,000 adult farmers and conduct agricultural classes in the normal schools for men and in the rural primary schools.